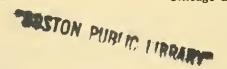
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MEMO TO: William McGrath, Transportation Coordinator

Boston Redevelopment Authority

FROM: Robert G. Davidson

Barton-Aschman Associates, Inc.

DATE: September 20, 1963

SUBJECT: Establishment of Preliminary Circulation

Planning Criteria for Downtown Boston

The purpose of this memorandum is to establish the gross planning criteria and travel magnitudes for the Central Business District Circulation and Parking Study. The quantities set forth below will act as initial overall design guides for the study. They will be further modified and refined as additional travel and land development information becomes available.

Downtown Boston is the single largest generator of travel in New England and is expected to continue in this dominant position. It lies in the hub of an ever increasing network of highway and rail transportation facilities. Over two million trips by people in cars, trucks, and mass transportation occur each day within this relatively small and intensely developed area. The future will see this magnitude continually increase as the Downtown Area remains the central site for commercial development.

The magnitude and characteristics of the many types of existing and future trips to Downtown Boston are specified below. These values have been assembled, collated, analyzed, and presented as the set of travel planning criteria within which the circulation plans for the Boston Central Business District are to conform. This conformance thereby assures that the CBD street, highway, parking, and mass transit development program is consistent with the travel habits and apparent desires of the three million people of Metropolitan Boston and the additional millions elsewhere in New England.

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The process for assembly of this planning criteria data has included review and analysis of all existing studies of the subject (see list of reference material in appendix) and numerous special studies undertaken in cooperation with the Boston Redevelopment Authority, the Boston Parking and Traffic Commission and the Boston Police Department. Additional information was gained from parts of many studies undertaken in large cities throughout the country.

A. PERSON TRIPS TO DOWNTOWN BOSTON *

Existing - 1963

The existing number of people who travel into Downtown Boston during an average day is estimated to be 570,000. This estimate is a product of reconcilation of data found in the Boston Redevelopment Authority Master Plan Draft (1963), Boston College Transportation Studies (1959), Metropolitan Transit Authority Data, Boston Parking and Traffic Commission Motor Vehicle Counts and Data supplied by the Boston Redevelopment Authority GNRP Project Area Transportation Plans.

The value of 570,000 person trips represents the one-way flow into Downtown Boston each day. The value does not include walking trips, the amount of trips that pass through the Downtown Area, or those trips generally staying within the area.

It is to be noted that the total number of person trips destined or originating in the downtown area each day is less than previously estimated quantities set forth in other studies. This circumstance can be traced to the extensive amount of transition of many sections of Downtown. Completion of the many buildings now proposed will re-establish the higher volumes of travel within two or three years.

^{*} Downtown Boston is that area of the Boston peninsula lying northeast of Massachusetts Avenue and bounded by the Charles River, Boston Harbor and the Fort Point Channel.

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Future - 1980

The amount of future travel to Downtown can be expected (as a minimum) to increase in the same general proportions as the amount of additional development to occur within the area. For each new building that places additional square feet of office, retail, wholesale and other types of uses within the Downtown Area, there will be additional travel by motor vehicle, truck and mass transportation. The additional amounts of each type of travel will be dependent upon the amount of new development, its location and the use to which it will be devoted. The Boston Redevelopment Authority Master Plan Draft of 1963 and other recent studies have visualized a growth factor in the Downtown Area of between 12-20%, by 1980. This growth pattern generally reflects the Metropolitan population and economic expansion expected by 1980. To be sure, the Downtown Area may receive more or less than the general estimates, depending upon local taxing policies, transportation improvements, and other influences. However, in very general terms, 12-20% expansion in the Downtown Area appears a valid range for over-all guidance for transportation planning.

Such an expansion will cause an additional 70,000 to 100,000 persons to be attracted into the Downtown area each day. The total average flow would then become 670,000 person trips per day. Unquestionably, other additional trips can be induced into the downtown when and if transportation facilities are created to provide better than normal accessibility; i.e. if off-street parking spaces are constructed in choice locations, or if rapid transit facilities are made far more convenient it can be expected that total travel will exceed the values quoted above. On the other hand, if transportation facilities are inadequate in capacity and convenience the amount of travel will be less than the quantity stated above.

B. MODAL SPLIT OF PERSON TRAVEL TO DOWNTOWN BOSTON

Existing - 1963

The type of transportation used by persons traveling to or from the Downtown Area is as shown below:

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1.	Person Trips by Motor Vehicles		380,000
	a) Automobile trips (motor vehicles at 1.54 occupants per vehicle)	230,000	
	b) Truck trips	30,000	
2.	Person trips by Mass Transportation		190,000
	a) By MTA Rail	160,000	
	b) By railroad	20,000	

Total Person Trips 570,000

10,000

These estimates have been assembled and collated by review of Cordon Count Data, reconciliation with other reports on transportation and MTA information. A review of the most recent data available shows that in 1962 the Downtown rapid transit stations experienced an additional decrease of downtown fare collections. As a result, estimated MTA rail person trips from the Downtown Area during an average day, has decreased from 180,000 in 1959 to 160,000 for the most recent year, 1962. Concurrently, motor vehicle travel to the Downtown Area appears to be steadily increasing, partly because of the opening of the Callahan Tunnel.

c) By bus (including MTA)

Future - 1980

The future mode of travel to downtown Boston and the Central Business District Project Area will be conditioned primarily by the capacity and convenience of the future network of facilities serving the area. During the past 15 years the major improvements to the transportation system have been in the form of creating new automobile facilities (i.e. Mystic River Bridge and the Northeast Expressway, Storrow Drive, the Southeast Expressway, the Central Artery and the Callahan Tunnel and East Boston Expressway). These facilities plus many local improvements have caused a very significant increase in automobile capacity and convenience into the downtown and accordingly a distinct and steady increase in automobile use.



Simultaneously the improvements to the transit system have been far fewer and the competitive position of transit has sharply diminished.

The immediate future is expected to be a continuation of the "emphasis on automobiles" trend. Projects now contemplated for completion within five years will contribute to a total automobile system containing a capacity of twice the size of that which existed just after World War II.

Unfortunately, the transit system has suffered heavily from the automobile competition and the inability to make comparable improvements. The rapid transit extension to Malden is the single improvement that can be counted upon in the next two years.

Those highway improvements that can be expected to directly increase the automobile capacities into and out of Downtown Boston are:

New Facilities	Estimated Additional Capacity one Direction - Per day
Warren Avenue Bridge	10,000 Vehicles
City Square-Leverett Circle Connection	10,000 "
Massachusetts Turnpike (3 lanes)	60,000 "
Albany Street Relocation	*
Dorchester Avenue Extensi	on * <u>5,000</u> " 85,000 Vehicles

^{*}NOTE: Albany Street and Dorchester Avenue improvements may create a greater additional capacity than shown. However, other changes in the South End may further reduce the entering capacity at Massachusetts Avenue.

 The additional motor vehicle capacities created by the above facilities are expected to be fully utilized. The resultant vehicle flows (in one-direction) into downtown Boston in the 1980 period will be increased as shown below:

	Vehicles/day
a. Existing (1963) motor vehicle flow (into Downtown Boston)	260,000
b. Existing through trips (discussed later)	140,000
c. Expected new volumes	85,000
Total 1980 Motor Vehicle Volume (Entering Downtown)	485,000

A good share of the entering vehicle capacity into the Downtown Area is utilized by traffic flowing from one side of Downtown to the other, i.e., through traffic. This condition is expected to continue because of the basic design of the expressway network. It is estimated that 185,000 vehicles will attempt to move through the Downtown Area in the future (both directions). The resultant capacity remaining for vehicles destined for the Downtown Area is 300,000 motor vehicles per day. This quantity, with an occupancy rate of 1.45 persons per auto will allow 430,000 persons to enter into Downtown each day in automobiles and trucks. Of these, 45,000 person trips are expected to be in trucks (an estimated 35,000 trucks) and 385,000 are expected to be in automobiles.

Rapid transit capacities entering, leaving and within the Downtown are not expected to change significantly nor be <u>fully</u> utilized. The extension to Malden will increase the capacity of the MTA mainline slightly because of improved design; the expected abandonment of commuter railroad service in downtown Boston can be described as a decrease in capacity. But these occurrences will have little effect upon the existing capacity, that far exceeds the current and expected use. Better use of the available transit capacity than now exists is dependent upon improvements that will extend good service into the constantly growing suburbs that lie beyond the MTA District.

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 Because of the Malden extension, commuter railroad elimination and other changes, rapid transit <u>use</u> is expected to increase. The 1980 projected mode of travel to downton Boston is as follows:

SUMMARY OF FUTURE TRAVEL PROJECTIONS *

1.	Person Trips by Motor Vehicl	.e	430,000
	a) Automobile trips	265,000	
	b) Truck trips	35,000	
2.	Person Trips by Mass Trans- portation		230,000
	a) By MTA rail	210,000	
	b) By bus (including MTA)	20,000	-
	Total Person Trips		660,000

^{*}NOTE: These are preliminary numbers subject to change.

Compared to existing flows, use of the downtown mass transportation system will increase from 190,000 person trips to 230,000 or 21%. The rapid transit system which must replace the service of the railroad is expected to increase from 160,000 to 210,000 or 31%. If these expectations prove valid, the rapid transit system would serve almost as many downtown trips as it did in 1950. In addition, these transit use projections call for a slight increase in the required role of transit in that it must accommodate 35% of all person trips to the downtown whereas it now accounts for 33.5%.

C. ESTIMATED TRAFFIC PASSING THROUGH DOWNTOWN BOSTON BY MODE

The basic pattern of the expressway and transit systems of Metropolitan Boston coupled with the geographic configurations of the land and water borders of the region and the location of Downtown Boston, create conditions which induce relatively large portions of travel to pass through the Downtown Area. Persons traveling from Dorchester, Quincy, Malden, etc. to the Northeast Sector of the Metropolitan



Area, i.e. East Boston, Revere, Chelsea, Lynn and the North Shore, find that the easiest route is the Central Artery, passing through the Downtown Area. Much the same is true of the transit system which is radial in nature, so that transit riders are encouraged to pass through Downtown in order to reach destinations on the other side of the Downtown Area.

The Inner Belt Circumferential can be expected to help reduce the proportion of vehicular through traffic once it is constructed. The relief that the Inner Belt will create will be primarily during the peak hours. Much of the off-peak travel will remain on the Central Artery because of its advantageous location.

Computations aimed at determining the exact amount of through traffic are less accurate than many of the other values computed in this report. Transportation studies indicate that the amount of through traffic in 1959 approximated 140,000 vehicles per day. This constituted 35% of the traffic entering the Downtown Area daily.

This value is generally consistent when reconciled with the amount of traffic entering and accumulating in the Downtown Area. These values are also known to be consistent with the amount of through traffic calculated by the Transportation Division of the BRA.

Through trips on rapid transit lines have been calculated as the difference between the average out-of Downtown transit stations and the number of persons leaving the Downtown Area on transit lines (after subtracting an estimated 10% of downtown station use as the quantity of intra-area downtown transit trips). Thus the calculations are as follows:

Existing - 1963

Number of persons leaving Downtown Area on transit lines		(240,000)
Number of persons paying fares at downtown stations - 1962	180,000	
Estimated number of intra- downtown trips	20,000	
Calculated volume of transit riders going out of Downtown		
per day		160,000
Resultant number of transit riders passing through Downtown		(80,000)

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Future - 1980

Future volume of transit riders traveling through the Downtown Area is pertinent to the Central Business District Project in that adequate capacity must be retained for these trips. However, actual 1980 volumes of through transit riders is impossible to estimate accurately because they will be so greatly influenced by the type and amount of development occurring throughout the Metropolitan Area, and the improvements made to the highway system. For purposes of calculation only, the future patterns and magnitudes have been assumed as follows:

Number of persons leaving Downtown (290,000)
Area on transit lines

Number of persons paying fares at downtown stations - 1980 235,000

Estimated number of intradowntown trips 25,000

Calculated volume of transit riders going out of down-town per day

210,000

Resultant number of transit riders passing through downtown

(80,000)

D. SECTOR OF ORIGINATION OF TOTAL DOWNTOWN DESTINED PERSON TRIPS

The origin of trips from throughout Metropolitan Area Boston to the Downtown Area and points beyond can only be determined by origin and destination surveys. At the present time, the Mass Transportation Commission of the Commonwealth is undertaking a comprehensive origin and destination survey. The results of this study will not be available for many months. Therefore, the data presented below has been taken from origin and destination counts undertaken previously by various organizations.



Existing - 1959

Sectors	No. of Trips	% of Total Flow
Northeast Northern Northwest Western Southwest Southern	82,000 94,000 73,000 78,000 73,000 170,000	14.2 % 16.4 12.75 13.75 12.8 29.7
	570,000	

Studies further estimated the number of person trips by transit and motor vehicles from each sector as follows:

Sectors	Estimated Transit Trips	Estimated Person Trip in Motor Vehicles
Northeast Northern Northwest Western	28,000 32,000 28,000 27,000	54,000 62,000 45,000 51,000
Southwest Southern	27,000 48,000 190,000	46,000 122,000 380,000

NOTE: These values reflect 1959 conditions before rail transit service to the South Shore was eliminated.

Future - 1980

The origins of trips to Downtown from throughout the Metropolitan Area in the future is strongly dependent on the patterns of residential and commercial development throughout the Eastern Massachusetts Area. This, in turn is strongly influenced by the improvements that will occur in the regional transportation network. 1 3 1 1

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The origins of trips to Downtown Areas is as shown below:

Sectors	% of Region	No. of Person Trips
N7 12	13.2	87,000
Northeast		108,000
North	16.4	·
Northwest	14.8	95,000
West	15.8	104,000
Southwest	10.7	71,000
Southern	29.5	195,000
		660,000

Estimates of mass transportation use for 1980 and the resultant number of person trips by motor vehicle are as follows:

			No. of T	rips
Sectors	No. of Transit Trips	% of Region	and Moto	r Vehicles
			%	of Region
Northeast	32,000	13.8	55,000	12.6
North	38,000	16.6	70,000	16.2
Northwest	36,000	15.8	59,000	14.3
West	34,510	15.0	70,000	16.2
Southwest	25,500	11.0	45,000	10.5
Southern	64,000	28.0	131,000	30.2
				
	230,000		430,000	

The above estimates of transit flows are dependent upon construction of the transit improvements listed as "accepted" and "recommended" in an earlier memo, dealing with Metropolitan Planning Projects. The failure to achieve any one of those projects will reduce the flows from that sector of the Metropolitan Area so concerned.

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E. DAILY PERSON TRIPS TO THE CENTRAL BUSINESS DISTRICT PROJECT AREA

The data described below is a preliminary estimate of the amount of travel by mode to the various parts of the Central Business District, based upon previous studies of origins and destinations throughout the Metropolitan Area. The primary source of data showing the relative distribution of trips within the Downtown Area are the Maguire and Coverdale and Colpitts Studies of 1945 and 1957. These distributions have been utilized by the Parking Study of the City Planning Board in 1954 and have been subsequently utilized here to allocate the person trips to the various functional areas in the Central Business District.

The area of the CBD referred to in this section is larger than the Project Area now under study. In addition to the CBD Project Area, this area contains the State House Area, all of the office districts, all of the leather-wholesaling district, and part of the South Cove Area.

The estimated number of person trips to this area by mode of transportation is as follows:

Existing - 1963

Total person trips for average	Person Trips/Day
day (excluding trucks)	265,000
Total person trips in motor vehicles (excluding trucks)	125 000
	135,000
Person trips using mass transpor- tation	130,000

The above number differs from the values shown in the Downtown Parking Study because of substantial changes in mass transportation use experienced during the past 7 years.

MTA data showing numbers of persons using MTA stations in this Central Business Area indicate that some 120,000 fares were paid at nearby transit stations. Assuming that 10,000 of these were for inter-area trips and that 20,000 out of a total of 30,000 rail and bus users had destinations in the CBD area, total transit users originating in this area are 130,000 rather than the 165,000 indicated in the Parking Report.

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s nis le . that ha The future amount of travel in the Central Business Area is in the first instance dependent entirely on the amount of growth of floor space and jobs within the Business District. For purposes of preliminary calculations, it has been assumed that total travel will increase from 12 to 20% and that mode of travel will increase accordingly as follows:

Future - 1980

	Person Trips/Day
Total person trips for average day (excluding trucks)	300,000-320,000
Total person trips in motor vehicles (excluding trucks)	145,000-155,000
Person trips using mass transpor-	
tation	155,000-165,000

F. DISTRIBUTION OF PERSON TRIP DESTINATIONS WITHIN THE CENTRAL BUSINESS DISTRICT PROJECT AREA *

The distribution of person trips within the Central Business Area is described below. The estimates are based upon data incorporated within the off-street parking study of the Boston City Planning Board (1954), the reports dealing with origins and destinations referred to above, and estimates of the travel generating power of land uses within the CBD. For each of the sub-zones of the Central Business Area the total amount of person trips is as follows:

Existing - 1963		Total Person Trips
Sub-Areas - 1. State 2. Office	e House Area ce District	20,000 80,000
3. Retain 4. Leath	il Area ner, Entertainment,	105,000
Parl	c Square Area	60,000
	Total	265,000

^{*}NOTE: This includes trips originating from outside of the Downtown Area only, and excludes truck and walk trips.

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Future - 1980	Total Person Trips
Sub-Areas - 1. State House Area 2. Office District 3. Retail Area 4. Leather, Entertainment, Park Square Area	22,000-23,000 93,000-98,000 122,000-131,000
	63,000-68,000
mot a l	300.000-320.000

The above values are considered as preliminary estimates. They will be further refined and modified to relate to the CBD project boundaries as soon as data on current land use within the project is made available.

The travel generating factors that have been utilized to calculate the amount of sub-area person trips per day are listed below. In all cases the data refers to the number of person trips originating from beyond the limits of Downtown Boston and therefore excludes intra-Downtown trips and walking trips.

	Trip Generation (in square feet of use per person trip)
a) Retail, Consumer Services and Institutional	70-100
b) Manufacturing and Utilities	110-140
c) Office	175-200
d) Wholesale and Storage	250-350

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Central Business District Barton-Aschman Assoc., Inc. Barton-Aschman Assoc., Inc.

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